

with eighteen to twenty-two pairs of chromosomes were frequently observed. The irregularities at meiosis probably account for complete sterility of pistillate and staminate flowers.

CONCLUSIONS

It may be concluded from the observations recorded above that:

1. *Cucurbita ficifolia* is genetically well separated from the cultivated annual species. Its closest connection is probably with *C. maxima* through *C. andreana*, the wild prototype of this species. However, the sterility of the F_1 hybrid between *C. andreana* \times *C. ficifolia* is so complete that an exchange of genes is stopped in the initial stages.

2. The F_1 hybrids were extremely vigorous after the first true leaves appeared. Usually only pistillate flowers reached anthesis in the F_1 plants. They were sterile when backcrossed to either parent. Parthenocarpic fruits were produced in great abundance by the F_1 plants. The great vigor of the F_1 plants can be accounted for in part by the fact that the vines produce no seed, but this explanation may be only partial. It is likely that hybrid vigor may have made a considerable contribution to the unusual growth of these plants.

3. For the most part the characters contributed by *Cucurbita ficifolia* were dominant in the hybrid, e.g., fruit shape, skin color; angled stem and petiole; more or less soft, pliable setae. The following *C. andreana* characters were evident: hard shell, bitter flesh, and annual growth habit.

U. S. Horticultural Field Station,
La Jolla, California

LITERATURE CITED

- WHITAKER, T. W. 1951. A species cross in *Cucurbita*. Jour. Hered. 42:65-69.
——— and G. W. BOHN. 1950. The taxonomy, genetics, production and uses of the cultivated species of *Cucurbita*. Econ. Bot. 4:52-81.

A NEW SPECIES OF BOWLESIA FROM PAKISTAN

EUGENE NASIR

The genus *Bowlesia* consists of three rather well-defined groups of species which have been accorded different status by different authors. The first group consists of those Chilean plants with erect, dichotomously branched stems and with stipules reduced to discrete cilia. These Bentham (1867) referred to his section *Homalocarpus* while Drude (1897) to his section *Elatae*. The second and third groups comprise weak-stemmed, prostrate, or spreading plants with evident, usually lacerate or fimbriate stipules; the second group has fruits bearing essentially sessile stellate hairs but no glochidia, whereas the third group has separate glochidia or, more commonly, a glochidiate wing extending along the

lateral ribs and sometimes also along the dorsal rib. Bentham regarded the presence of glochidia as of specific rather than generic value, and included the two latter groups in his section *Eubowlesia*. Drude thought it of generic significance, placing the non-glochidiate fruited species in his section *Tenerae* of *Bowlesia*, but referring the glochidiate ones to the allied genus *Drusa* of the Canary Islands and northern Africa. *Drusa*, according to Bentham, was also to be regarded as part of *Bowlesia* section *Eubowlesia*. Most subsequent authors have apparently referred all American material to *Bowlesia*, and have restricted *Drusa* to the type species, *Drusa glandulosa* (Poir.) H. Wolff or *D. oppositifolia* DC., of the Old World.

An understanding of these interpretations of *Bowlesia* and *Drusa* is important here because any conclusions as to the geographical patterns of distribution depend upon how many genera are recognized, and to which of the two the glochidiate-fruited American species are assigned.

Excluding section *Homalocarpus* or *Elatae* of *Bowlesia*, some of the more important characters of *Drusa* and the remaining species of *Bowlesia* may be tabulated as follows:

<i>Bowlesia</i> (non-glochidiate species)	<i>Bowlesia</i> (glochidiate species)	<i>Drusa</i>
Calyx lobes evident	Calyx lobes evident	Calyx obsolete
Fruit stellate-pubescent, non-glochidiate, inflated	Fruit with lateral and dorsal ribs glochidiate, often stellate-pubescent,	Fruit with lateral ribs glochidiate-winged, otherwise glabrous, dorsally flattened
Stem stellate-pubescent and sometimes with simple hairs	angled or variously flattened	Stem glochidiate, otherwise glabrous
	Stem stellate-pubescent and sometimes with simple hairs	

It is evident from the comparative study of the non-glochidiate and glochidiate species of *Bowlesia* and that of *Drusa* that there is a complete bridging of the morphological gap between the two genera, and it is difficult to tell where one genus ends and the other begins. Taking all these facts into consideration, it may be advisable to include *Drusa* within *Bowlesia*.

Bowlesia is chiefly a South American genus, extending from southern Chile and Argentina northward to Ecuador and Brazil, and recurring in Central America and Mexico, with one species in Texas and California. *Drusa* is confined to the Canary Islands and Morocco. Thus neither *Drusa* nor *Bowlesia* has been reported from either Europe or Asia, so the discovery of a species of *Bowlesia* in northwestern Pakistan is truly a remarkable find.

This plant was collected in the first week of May, 1936, by Ramchand, a student of Gordon College, in Topi Park, two or three miles from Rawal-

pindi. Rawalpindi is situated between 33° and 34° N. latitude at an altitude of 1600 feet, on a plain about 15 miles south of the foot of the Himalayas. Topi Park occupies a slightly hilly area of about four square miles, which has three ponds and a small ravine that remains dry for half the year. The vegetation of this area is preserved in its natural state and consists mainly of such xerophytic plants as *Acacia modesta*, *Gymnosporia Royleana*, *Otostegia limbata*, *Olea cuspidata*, *Adhatoda Vasica*, *Zizyphus nummularia*, *Ehretia aspera*, *Tribulus terrestris*, *Filago germanica*, *Cousinia minuta*, and many others. Near water and in low-lying areas where the soil remains damp for a longer period, there are many herbs, such as *Ranunculus arvensis*, *R. muricatus*, *Sisymbrium Irio*, *S. Sophia*, *Senebiera didyma*, *Lepidium Draba*, *Geranium rotundifolium*, *Medicago denticulata*, and *Rumex dentatus*.

It is probable that the specimen of *Bowlesia* was collected in one of these moister and more sheltered spots. There are doubtless specimens of this species extant in the larger herbaria of the world, but their identity has not been recognized.

***Bowlesia asiatica* sp. nov.** Herba annua prostrata dichotoma caulibus gracilibus quadrangulosis elongatis basi diametro $\frac{1}{2}$ – $\frac{3}{4}$ mm. striatis glabratibus vel pilis 8-radiatis breviter stipitatis vel sessilibus leviter stellato-pubescentibus obsitis. Folia opposita 10 mm. longa, 15 mm. lata petiolic longis connatis laminis lobis 5 (4–6) tribus centralibus inter se similibus ovalibus vel ovatis eis 2 lateralibus minoribus palmato-lobatis subtus albo-griseis basi venis principalibus 3 (interdum 4–5) valde ventais ambitu pilis stellatis 8-radiatis stipitatis praecipue subtus obsitis pilis inaequaliter radiatis praesertim supra ad apices versus obsitis marginibus pilis 2–5-radiatis item stellato-pubescentibus. Petioli laminibus 4–6-plo longiores stipulis lanceolatis albis membranaceis minute laceratis instructi. Umbellae simplices axillares subsessiles \pm 2–5-floribus ex nodis erumpentes. Involucri bractee paucae albae scariosae laceratae. Flores parvi calycis dentibus prominentibus lanceolato-ovatis albis laceratis petalis purpureis late ovalibus acutis inflexis calycis dentes paulo superantibus stylo brevi stylopodio parvo conicali carpellis juvenibus dorsaliter paulo compressis dense stellato-pubescentibus. Fructus ellipsoideo-globosus subsessilis pilis stellatis eis caulibus dimidio longioribus obtectis jugis inconspicuis faciebus dorsalibus inflatis quam faciebus noninflatis lateralibus magis pubescentibus usque ad 2 mm. longus 1.5 mm. latus.

Prostrate, dichotomously branched annual (fig. 1), the stem slender, quadrangular and $\frac{1}{2}$ – $\frac{3}{4}$ mm. in diameter near base, up to 20 cm. long, grooved, glabrate to lightly stellate-pubescent, the hairs 8-rayed with short stalks or sessile (figs. 3 and 4); leaves opposite, long-petiolate, leaf lamina 10 mm. long and 15 mm. broad, palmately lobed, usually with 5 (4–6) lobes, the 3 central lobes equal, oval to ovate, the 2 lateral lobes smaller (fig. 2), prominently veined on the ventral surface, with usually 3 (occasionally 4 or 5) principal veins at base, the ventral surface whitish-



FIGS. 1-11. *Bowlesia asiatica*. FIG. 1. Habit sketch, $\times \frac{2}{3}$. FIG. 2. Habit sketch, $\times 3$. FIGS. 3, 4. Stem hairs, $\times 20$. FIGS. 5, 6. Dorsal leaf hairs, $\times 20$. FIG. 7. Distal leaf hairs, $\times 20$. FIG. 8. Flower and young carpel, $\times 10$. FIG. 9. Mature fruit, lateral view, $\times 10$. FIG. 10. Single carpel, commissural view, $\times 10$. FIG. 11. Fruit hairs, $\times 20$.

grey, both surfaces covered with stalked, stellate, 8-rayed hairs (figs. 5 and 6), these more numerous on the ventral surface, unequally 2-5-rayed hairs occurring on the upper surface especially distally, the margins also stellate-pubescent with 2-5-rayed hairs (fig. 7); petioles 4-6 times longer than the lamina, connate at base, stipulate, the stipules lanceolate, white, membranous, minutely lacerate; umbels simple, axillary, borne at the nodes, subsessile, 2-5-flowered (fig. 2); involucre of a few scarious, white, lacerate bracts; flowers small; calyx teeth prominent, lanceolate-ovate, white, lacerate; petals purple, broadly oval, acute, inflexed, slightly longer than the sepals; style short; stylopodium small, conical; young carpels slightly compressed dorsally, densely stellate pubescent (fig. 8); fruit ellipsoid-globose, subsessile, up to 2 mm. long and 1.5 mm. broad (figs. 9 and 10), covered with stellate hairs half as large as those of the stem (fig. 11), the ribs inconspicuous, the inflated dorsal sides hairier than the uninflated laterals.

Type. Topi Park, Rawalpindi, Pakistan, May, 1936 *Ramchand* (herbarium of Gordon College, Rawalpindi).

The writer wishes to express his appreciation of a Fulbright Travel Grant from the United States Education Foundation, Pakistan, and a scholarship from the United Presbyterian Board of Foreign Missions, Philadelphia, which made it possible for him to prosecute research in the United States; and to Dr. Lincoln Constance, for his guidance and help in the preparation of this paper.

Department of Botany,
University of California, Berkeley
and
Gordon College, Rawalpindi, Pakistan

LITERATURE CITED

- BENTHAM, G. 1867. Umbelliferae, in Benth. & Hook. Gen. Pl. 1:859-931.
DRUDE, C. G. O. 1897-1898. Umbelliferae, in Engl & Prantl, Nat. Pfl. 38:63-271.

REVIEWS

New Zealand Pollen Studies, The Monocotyledons. By LUCY M. CRANWELL. 91 pp., 8 colotype plates, 66 text figures, 1 map. 1953. Bulletin of the Auckland Institute and Museum, No. 3. Published by Harvard University Press for Auckland Institute and Museum. Cloth, \$5.00; paper, \$3.50.

Lucy M. Cranwell's recent account of the pollen of the New Zealand monocotyledons is a welcome addition to the expanding volume of literature dealing with the comparative morphology and taxonomy of pollen of the world's vegetation. Gilbert Archey, Director of the Auckland Institute and Museum in his introduction to the present bulletin has correctly pointed out the importance of the need for a sound morphological and systematic basis in dealing with pollen of living plants before proceeding with identification and interpretation of fossil pollen, as well as for the overall application of pollen studies as an increasingly important biosystematic discipline in taxonomy. In addition, applied fields, such as hayfever and honey investigations, should ultimately benefit from these studies. It is, however, primarily to the object of